

IN THE DRAWINGS:

Submitted herewith are replacement sheets for Figs. 1A and 13-16 incorporating revisions to change the cross-sectional lines "X-X" and "Y-Y" to "1B-1B" and "1C-1C", respectively, and to label Figs. 13-16 with the legend "Prior Art."

REMARKS

In the last Office Action, the Examiner advised that the listing of references in the specification is not a proper information disclosure statement and that, unless the references have been cited by the Examiner on Form PTO-892, they have not been considered by the Examiner. Figs. 13-16 were objected to because they are not labeled with the legend "Prior Art". The specification and claims were objected to as containing informalities. Claims 1, 2, 8 and 11-16 were rejected under 35 U.S.C. §112, second paragraph, for indefiniteness. Claims 1-3, 7, 13 and 16 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,650,804 to Mills et al. ("Mills"). Claims 4 and 6 were objected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of U.S. Patent No. 6,542,656 to Hill. Claims 9 and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of U.S. Patent No. 6,317,532 to Lin et al. ("Lin"). Claim 14 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of U.S. Patent No. 6,259,825 to Jing. Claims 5 and 10 were objected to as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 8, 12 and 15 were indicated to be

allowable if rewritten to overcome the rejections under 35 U.S.C. §112, second paragraph, and to include all of the limitations of the base claim and any intervening claims. Additional art was cited of interest.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claims 5, 8, 10, 12 and 15. However, for the reasons noted below, applicants submit that amended claims 1-4, 6, 7, 9, 11, 13, 14 and 16 and newly added claims 17-20 also patentably distinguish from the prior art of record.

In accordance with the present response, the specification has been suitably revised to correct informalities, including those noted by the Examiner, and to bring it into better conformance with U.S. practice. Original independent claim 1 has been amended to further patentably distinguish from the prior art of record. Original claims 1-16 have also been amended to improve the wording, overcome the objections and indefiniteness rejection raised by the Examiner, and bring them into better conformance with U.S. practice. New claims 17-20 have been added to provide a fuller scope of coverage. A new abstract which more clearly reflects the invention to which the amended and new claims are directed has been substituted for the original abstract.

Submitted herewith are replacement sheets for Figs. 1A and 13-16 incorporating revisions to change cross-sectional lines "X-X" and "Y-Y" to "1B-1B" and "1C-1C", respectively, and to label Figs. 13-16 with the legend "Prior Art" to overcome the Examiner's objection.

In view of the foregoing, applicants submit that the objection to the drawings, specification and claims and the rejection under 35 U.S.C. §112, second paragraph, have been overcome and should be withdrawn.

Applicants respectfully request reconsideration of their application in light of the following discussion.

Consideration of References Cited in Specification

In the Office Action, the Examiner pointed out that the references identified in the specification were not considered because the citation of references within a specification is not a proper information disclosure statement. Applicants note that the specification discusses the pertinent disclosure of the references identified therein and that such discussion constitutes admitted prior art that should be considered by the Examiner in determining patentability.

Brief Summary of Invention

The present invention is directed to an optical switch and to an optical switch device.

As described in the specification (pages 1-9), conventional optical switch devices are associated with long optical paths along which beams emitted from optical fibers are guided during switching operations. Furthermore, mirrors for guiding the beams along the optical paths are arranged so as to occupy a large area which increases the overall size of the conventional optical switches.

The present invention overcomes the drawbacks of the conventional art.

Fig. 10 shows an embodiment of an optical switch according to the present invention embodied in the claims. The optical switch has at least a first optical fiber 2, a second optical fiber 3, and a third optical fiber 5 disposed generally parallel to each other and spaced at non-equal intervals and having tip portions disposed approximately along a straight line. The optical switch has first guiding means (e.g., mirrors 18a-18c) and second guiding means (e.g., mirrors 19a-19d). The first guiding means is non-movably mounted in front of the tip portions of the optical fibers 2, 3, 5 for guiding a beam emitted from the first optical fiber 2 to the second optical fiber 3 along a first optical path

disposed between the tip portion of the first optical fiber 2 and the tip portion of the second optical fiber 3. The second guiding means is mounted for undergoing movement to a position in front of the tip portions of the optical fibers 2, 3, 5 for guiding the beam emitted from the first optical fiber 2 to the third optical fiber 5 along a second optical path disposed between the tip portion of the first optical fiber 2 and the tip portion of the third optical fiber 5. The second optical path has a length (i.e., $2F+A+B+C$) substantially equal to a length (i.e., $2F+2E+2D+A$, where $B+C=2E+2D$) of the first optical path.

By the foregoing construction, the length of the optical paths along which a beam from one optical fiber is guided to another optical fiber of the optical switch is shorter as compared to the conventional art. Furthermore, by providing the non-movable first guiding means and the movable second guiding means, the overall size of the optical switch is reduced as compared to conventional optical switches.

Traversal of Prior Art Rejections

Rejection Under 35 U.S.C. §102(e)

Claims 1-3, 7, 13 and 16 were rejected under 35 U.S.C. §102(e) as being anticipated by Mills. Applicants respectfully traverse this rejection and submit that amended

claims 1-3, 7, 13 and 16 recite subject matter which is not identically disclosed or described in Mills.

Amended independent claim 1 is directed to an optical switch and requires at least first, second, and third optical fibers disposed generally parallel to each other and spaced at non-equal intervals and having tip portions disposed approximately along a straight line, first guiding means non-movably mounted in front of the tip portions of the optical fibers for guiding a beam of light emitted from the first optical fiber to the second optical fiber along a first optical path disposed between the tip portion of the first optical fiber and the tip portion of the second optical fiber, and second guiding means mounted for undergoing movement to a position in front of the tip portions of the optical fibers for guiding the beam emitted from the first optical fiber to the third optical fiber along a second optical path disposed between the tip portion of the first optical fiber and the tip portion of the third optical fiber so that a length of the second optical path is substantially equal to a length of the first optical path. No corresponding structural combination is disclosed or described by Mills.

Mills discloses in Fig. 3 an optical switch 10b having pairs of input and output ports 38-1 to 38-4 (optical fibers) and fixed and switchable deflectors 40a-40e (guiding

means). The input and output ports 38-1 to 38-4 are staggered to create equal length light paths. A similar optical switch 10c having staggered input and output ports 48-1 to 48-4 is disclosed in Fig. 4 of Mills. Stated otherwise, tip portions of the input and output ports in the optical switches disclosed by Mills are staggered and thus not disposed approximately along a straight line.

In contrast, amended independent claim 1 requires first, second, and third optical fibers disposed generally parallel to each other at non-equal intervals and having tip portions disposed approximately along a straight line. Claim 1 further requires first and second optical paths having substantially equal lengths. Thus while the optical switch of Mills and the optical switch recited in amended claim 1 achieve approximately equal length optical paths, amended claim 1 can achieve this without requiring the optical fibers to be staggered, but rather provides optical fibers which are disposed generally parallel to each other at non-equal intervals and which have tip portions disposed approximately along a straight line. By this construction, the optical switch recited in amended claim 1 can be fabricated much smaller than the optical switch disclosed by Mills which requires a large space to accommodate the staggered input and output ports.

In the absence of the foregoing disclosure recited in amended independent claim 1, anticipation cannot be found. See, e.g., W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) ("Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration"); Continental Can Co. USA v. Monsanto Co., 20 USPQ2d 1746, 1748 (Fed. Cir. 1991) ("When more than one reference is required to establish unpatentability of the claimed invention anticipation under § 102 can not be found".); Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added) ("Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim").

Stated otherwise, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention. This standard is clearly not satisfied by Mills for the reasons stated above. Furthermore, Mills does not suggest the claimed subject matter and, therefore, would not have motivated one skilled in the art to modify Mills' optical switch to arrive at the claimed invention.

Claims 2, 3, 7, 13 and 16 depend on and contain all of the limitations of amended independent claim 1 and, therefore, distinguish from the reference at least in the same manner as claim 1.

In view of the foregoing, applicants respectfully request that the rejection of claims 1-3, 7, 13 and 16 under 35 U.S.C. §102(e) as being anticipated by Mills be withdrawn.

Rejections Under 35 U.S.C. §103(a)

Claims 4 and 6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Hill. Applicants respectfully traverse this rejection and submit that the combined teachings of Mills and Hill do not disclose or suggest the subject matter recited in amended claims 4 and 6.

Mills does not disclose or suggest the subject matter recited in amended independent claim 1 as set forth above for the rejection under 35 U.S.C. §102(e). Claims 4 and 6 depend on and contain all of the limitations of amended independent claim 1 and, therefore, distinguish from the reference at least in the same manner as claim 1.

The secondary reference to Hill has been cited for its disclosure of an optical switch used in an optical communication part of an add-drop system. However, as recognized by the Examiner, Hill does not disclose or suggest the structural combination of the optical switch recited in

amended claim 1, from which claims 4 and 6 depend, including first, second, and third optical fibers disposed generally parallel to each other at non-equal intervals and having tip portions disposed approximately along a straight line. Since Hill does not disclose or suggest these structural features recited in amended independent claim 1, it does not cure the deficiencies of Mills. Accordingly, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

In view of the foregoing, applicants respectfully request that the rejection of claims 4 and 6 under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Hill be withdrawn.

Claims 9 and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Lin. Applicants respectfully traverse this rejection and submit that the combined teachings of Mills and Lin do not disclose or suggest the subject matter recited in amended claims 9 and 11.

Mills does not disclose or suggest the subject matter recited in amended independent claim 1 as set forth above for the rejection under 35 U.S.C. §102(e). Claims 9 and 11 depend on and contain all of the limitations of amended independent claim 1 and, therefore, distinguish from the reference at least in the same manner as claim 1.

The secondary reference to Lin has been cited for its disclosure of mirrors in an optical switch capable of reflecting only one beam. However, as recognized by the Examiner, Lin does not disclose or suggest the structural combination of the optical switch recited in amended claim 1, from which claims 9 and 11 depend, including first, second, and third optical fibers disposed generally parallel to each other at non-equal intervals and having tip portions disposed approximately along a straight line. Since Lin does not disclose or suggest these structural features recited in amended independent claim 1, it does not cure the deficiencies of Mills. Accordingly, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

In view of the foregoing, applicants respectfully request that the rejection of claims 9 and 11 under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Lin be withdrawn.

Claim 14 was rejected under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Jing. Applicants respectfully traverse this rejection and submit that the combined teachings of Mills and Jing do not disclose or suggest the subject matter recited in amended claim 14.

Mills does not disclose or suggest the subject matter recited in amended independent claim 1 as set forth above for the rejection under 35 U.S.C. §102(e). Claim 14 depends on and contains all of the limitations of amended independent claim 1 and, therefore, distinguishes from the reference at least in the same manner as claim 1.

The secondary reference to Jing has been cited for its disclosure of lenses for converging or collimating a beam. However, as recognized by the Examiner, Jing does not disclose or suggest the structural combination of the optical switch recited in amended claim 1, from which claim 14 depends, including first, second, and third optical fibers disposed generally parallel to each other at non-equal intervals and having tip portions disposed approximately along a straight line. Since Jing does not disclose or suggest these structural features recited in amended independent claim 1, it does not cure the deficiencies of Mills. Accordingly, one ordinarily skilled in the art would not have been led to modify the references to attain the claimed subject matter.

In view of the foregoing, applicants respectfully request that the rejection of claim 14 under 35 U.S.C. §103(a) as being unpatentable over Mills in view of Jing be withdrawn.

Applicants respectfully submit that new claims 17-20 also patentably distinguish from the prior art of record.

New independent claim 17 is directed to an optical switch and requires a main body, at least first, second and third optical fibers mounted on the main body and disposed generally parallel to each other so that tip portions of the optical fibers are disposed approximately along a straight line, first guiding means integrally mounted on the main body for intersecting a beam emitted from the first optical fiber and for guiding the beam to the second optical fiber along a first optical path having a preselected length, and second guiding means mounted on the main body for undergoing movement relative to the main body to intersect the beam emitted from the first optical fiber and guide the beam to the third optical fiber along a second optical path having substantially the preselected length. No corresponding structural combination is disclosed or suggested by the prior art of record. For example, Mills, Hill, Lin and Jing, either alone or in combination, do not disclose or suggest first, second and third optical fibers mounted on the main body and disposed generally parallel to each other so that tip portions of the optical fibers are disposed approximately along a straight line, as recited in claim 17, as set forth above for amended independent claim 1.

Claims 18-20 depend on and contain all of the limitations of independent claim 17 and, therefore, distinguish from the prior art of record at least in the same manner as claim 17.

In view of the foregoing amendments and discussion, the application is believed to be in allowable form. Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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MAILING CERTIFICATE

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November 12, 2004
Date